Claims

1. Method for the thermomechanical treatment of steel, wherein the starting material is heated to a temperature above the recrystallization temperature, austenitized, held for equalization of temperature, then deformed and finally quenched to martensite and tempered, characterized by starting out with round steel rods, the heating temperature of which is equalized over the rod length and which then are transformed by skew rolling, while remaining approximately straight, so that a predetermined twisting of the material in the marginal area and a desired transformation gradient is achieved over the cross section, and wherein, after the critical degree of transformation is exceeded, dynamic recrystallization processes take place, whereupon the rods are reheated to a temperature above Ac3, in order finally to be hardened and tempered.

2. Method of claim 1, characterized in that the material is heated at a rate between 100° - 400°K/s.

3. Method of claim 1 or claim 2, characterized in that the starting material is heated to a temperature between 700° and 1100°C.

4. Method of one or more of the claims 1 to 3, characterized in that the heating is performed inductively.

5. Method of one or more of the claims 1 to 4, characterized in that the equalization of the heating temperature of the rod takes place for at least 10 seconds.

6. Method of one or more of the claims 1 to 5, characterized in that the temperature difference over the length of the rod does not exceed 5 K.

7. Method of one or more of the claims 1 to 6, characterized in that the heating temperature of the rod is kept constant virtually up to its entry into the roll gap.

8. Method of one or more of the claims 1 to 7, characterized in that the transformation is performed by skew rolling in one step.

9. Method of one or more of the claims 1 to 8, characterized in that the skew rolling of the rod is performed with an average degree of degree of stretching λ of at least 1.3.

10. Method of one of the claims 8 or 9, characterized in that the maximum transformation in the marginal area amounts to between 0.65 and 1.0 times the diameter of the rod and ψ is at least 0.3.

11. Method of one or more of the claims 1 to 10, characterized in that, in the skew rolling, a maximum local temperature elevation of 50°K is not exceeded.

12. Method of one or more of the claims 1 to 11, characterized in that the direction of the twisting of the structure in the marginal region of the particular round rod corresponds to the main direction of tension of a component stressed by torsion.

13. Method of claim 12, characterized in that the direction of twist of the structure in the marginal region, with respect to the axis of the round rod, amounts to 35 - 65 degrees of angle.

14. Method of one or more of the claims 1 to 13, characterized in that the structural distribution over the cross section of the finish-worked round rod leads to a property profile, which is adequate for the tension profile over the cross section in the case of flexural and/or torsional stress.

15. Method of one or more of the claims 1 to 14, characterized in that the skew rolling is performed in a temperature range of 700° - 100°C.

16. Method of one or more of the claims 1 to 15, characterized in that the rolls of the skew rolling stand are adjusted in the axial and/or radial direction during the transformation operation and the round rods are produced with a diameter, which varies over their length.

17. Method of one or more of the claims 1 to 16, characterized in that during a reheating above Ac3 following the skew rolling the temperature difference over the rod length is limited to maximum 5°K.

18. Method of one or more of the claims 1 to 17, characterized in that it starts out from spring steel.

19. Method of one or more of the claims 1 to 17, characterized in that it starts out from a silicon-chromium steel.

20. Method of one or more of the claims 1 to 17, characterized in that it starts out from a microalloyed steel.

21. Method of one or more of the claims 1 to 20, characterized in that the skew-rolled, approximately straight rod is wound into a coil spring.

22. Method of one or more of the claims 1 to 20, characterized in that the skew-rolled, approximately straight rod is bent into a stabilizer.

23. Method of one or more of the claims 1 to 20, characterized in that the skew-rolled rod remains approximately straight and its ends are worked.

24. Method of claim 21 or 20, characterized in that the winding and/or bending is performed hot after the recrystallization and before the hardening and tempering.